RESEARCH

Communication loads on clinical staff in the emergency department

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ABSTRACT

Objective: To measure communication loads on clinical staff in an acute clinical setting, and to describe the pattern of informal and formal communication events.
Design: Observational study.
Setting: Two emergency departments, one rural and one urban, in New South Wales hospitals, between June and July 1999.
Participants: Twelve clinical staff members, comprising six nurses and six doctors.
Main outcome measures: Time involved in communication; number of communication events, interruptions, and overlapping communications; choice of communication channel; purpose of communication.
Results: 35 hours and 13 minutes were observed, and 1286 distinct communication events were identified, representing 36.5 events per person per hour (95% CI, 34.5–38.5). A third of communication events (30.6%) were classified as interruptions, giving a rate of 11.15 interruptions per hour for all subjects; 10% of communication time involved two or more concurrent conversations; and 12.7% of all events involved formal information sources such as patients' medical records. Face-to-face conversation accounted for 82%. While medical staff asked for information slightly less frequently than nursing staff (25.4% v 30.9%), they received information much less frequently (6.6% v 16.2%).
Conclusion: Our results support the need for communication training in emergency departments and other similar workplaces. The combination of interruptions and multiple concurrent tasks may produce clinical errors by disrupting memory processes. About 90% of the information transactions observed involved interpersonal exchanges rather than interaction with formal information sources. This may put a low upper limit on the potential for improving information processes by introducing electronic medical records.

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SEVERAL STUDIES quantifying the impact of poor communication on clinical work suggest that communication is a likely cause of systematic error in the health system. In Australia, inadequate communication has been associated with 17% of system problems, and, of these, 84% were deemed potentially preventable.[1] About 50% of all adverse events detected by general practitioners were associated with communication difficulties.[2] Within intensive care units, 2% of the activity consists of verbal communication between nurses and doctors, but accounts for 37% of error reports.[3] Thus, the evidence strongly suggests that poor communication wastes time, threatens patient care and may be one of the chief culprits behind preventable adverse events in clinical practice.[4]

The research reported here extends work begun in the United Kingdom in the mid-1990s,[5,6] in which it was found that physician teams in hospital were subject to high levels of interruption. Clinical staff also appeared to bear a higher communication load than necessary, considering the many tasks that could be accomplished by accessing information sources rather than asking questions of people. It has since been hypothesised that such interruptions impose cognitive loads on clinical staff and have a negative impact on memory, leading to clinical error.[7]

As a continuation of this research, we measured communication load more precisely and studied communication patterns in a high-workload clinical setting.

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METHODS

Subjects

Twelve clinical staff from two emergency departments — a 200-bed rural hospital and a 540-bed urban tertiary teaching hospital in New South Wales — participated in an observational study of communication load. The subjects, three nurses and three medical practitioners from each department, volunteered after an information session.

Ethical approval

Ethics approval was obtained from the respective institutional ethics committees.

Data collection

Subjects were shadowed for 1 hour 30 minutes to 2 hours by one of two researchers during the morning, afternoon or evening shift of a normal weekday. Researchers shadowed subjects at both hospitals. Subjects wore a lapel microphone and carried a transmitter, which recorded their conversations with patients and other staff. Each subject obtained verbal consent by informing

1: Glossary

- Formal communication: When a message conforms to a predetermined structure (ie, is in a predefined form).
- Informal communication: When the message structure is determined solely by the conversing parties.
- Synchronous communication: When two parties exchange messages across a communication channel at the same time (eg, telephone).
- Asynchronous communication: When communication exchange does not require both parties to be active in the conversation at the same time (eg, email). The recipient can deal with communication at a time of his or her choosing.
- Interruption: A communication event in which the subject did not initiate the conversation, and which used a synchronous communication channel.
- Multitasking: A period when two or more concurrent communication events occur.

patients that their conversation was being recorded. Subjects and patients could request the suspension of recording or retrospectively exclude recorded material. The researcher observed from a distance, timing events, and noting the individuals involved and relevant contextual information.

Field notes and subject conversations were transcribed verbatim. Individual communication events were then identified from the transcripts. A communication event was defined as the passing of a message from one individual to another across a communication channel. Thus, face-to-face discussions, telephone conversations or entry of text into a medical record all counted as communication events. Each event was then coded for channel, purpose and other party. As each communication event could involve more than two people or more than one purpose, some had multiple classifications. Thus, some proportions in the Results section sum to greater than 100%.

Measurement of communication load and pattern

The communication load on clinical staff was measured by the proportion of observed time spent in communication, the proportion of communication events involving concurrent communication tasks, and the proportion of interruptions experienced by subjects. We calculated the rates of communication events and interruptions and 95% CIs for counted variables.

Patterns of communication were examined by classifying communication events into informal (face-to-face conversation, telephone, pager, letter, whiteboard and email) or formal (patients' medical records, computer information system, test results, forms, medical literature, drug manuals); the purpose of communication (eg, test ordering, results gathering or exchange of information); and by the channel of communication (synchronous or asynchronous; *see Glossary,* Box 1*)*.

RESULTS

The six nurses and six doctors were observed in June and July 1999. During the 35 hours and 13 minutes of observation time, 1286 distinct communication events were identified, representing an average of 36.5 events per person per hour (95% CI, 34.5–38.5). The medical staff experienced 33.6 events per hour (n=625; 95% CI, 31.0–36.2) and nursing staff 39.8 per hour (n=661; 95% CI, 36.7–42.8) (Box 2).

Communication loads

About 28 hours and 12 minutes, or 80% (78.7% for doctors, 81.7% for nurses) of the total time, subjects were engaged in communication events. For 3 hours and 48 minutes, or 10% (14.6% doctors, 6.7% nurses) of this communication time, subjects were carrying out two or more overlapping conversations (multitasking) (Box 2). This was in addition to any other tasks that might be concurrently active, such as handling medications. Medical staff had a significantly greater period of multitasking compared with nursing staff (χ^2=27.0; df=1; P<0.001).

Nearly a third (30.6%; n=393) of communication events were classified as interruptions, meaning that they were not initiated by the observed subject,

2: Summary of communication data for the 12 clinical staff in the study

	Medical staff	Nursing staff	Total
Communication events			
Number of events	625	661	1286
Observation time (hours)	18:36	16:37	35:13
Total event time (hours)	14:38	13:33	28:12
Overlap time (hours)	2:42	1:04	3:48
Number of communication events initiated by subject	421	472	893
Number of interruptions	208	185	393
Communication channels (number of events)			
Face to face	479	576	1055
Telephone	41	25	66
Pager	17	3	20
Computer	29	21	50
Patient's medical record	34	31	65
Forms	20	16	36
Medical literature	3	1	4
Test results	3	0	3
Drug manual	0	0	0
Letter	4	1	5
Whiteboard	0	6	6
Email	0	0	0

As each communication event could involve more than two people or more than one purpose, some had multiple classifications.

and occurred using a synchronous communication channel such as face-to-face conversation. This gave a rate of 11.15 interruptions per hour for all subjects. While a greater proportion of doctors' communication events (33.3%; n = 208) compared with those of nurses (28.0%; n = 185) were classified as interruptions (χ^2 = 4.23; df = 1; $P < 0.05$), both groups experienced similar interruption rates (respectively, 11.1 [95% CI, 9.7–12.7] and 11.2 [95% CI, 9.5–12.7] interruptions per hour).

Communication methods used by subjects

Almost 89% (n=1141) of all events involved the use of a synchronous channel (Box 2). Of the possible synchronous channels, face-to-face conversation clearly was dominant, accounting for 82% (n=1055) of all conversation events (87.1% for nurses, 76.6% for doctors). Informal communication sources accounted for 89.6% (n=1152) of events (92.4% for nurses and 86.6% for doctors).

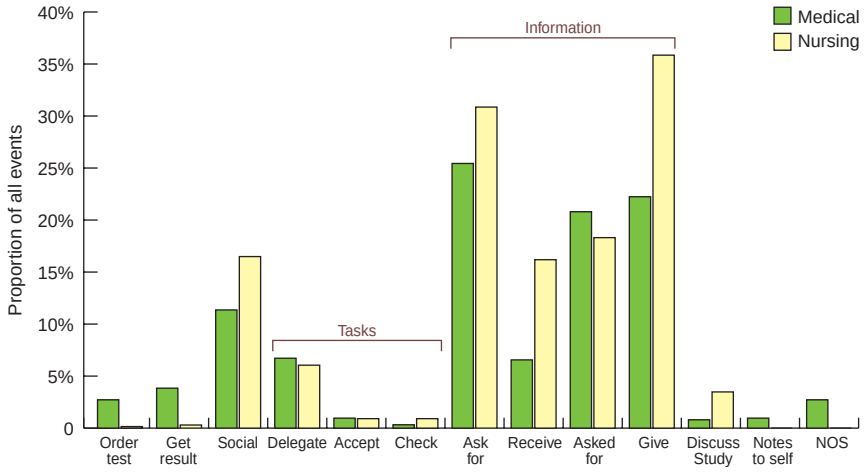
Fewer communications, 12.3% (n=158) (10.4% for nurses and 14.2% for doctors), involved formal information sources (Box 2).

Purpose of communication

Events were analysed by the purpose of the task being carried out. Test-ordering (1.5% of events) and results-gathering (2.2% of events) accounted for only a few events, and the bulk (94.8%) were related to the exchange of information between clinical staff (Box 3).

This information exchange was subcategorised as "asking" or "being asked for" information, and "giving" or "receiving" information. While medical staff asked for information slightly less than nursing staff (25.4% [n=159] v 30.9% [n=204]), they received information much less frequently (6.6% [n=41] v 16.2% [n=107]). Medical staff seemed to be asked for information as often as nurses (20.8% [n=130] v 18.3% [n=121]) but seemed to give information less frequently (22.2% [n=139] v 35.8% [n=237]).

3: Purpose of communication events in the emergency department



Communication events are expressed as a proportion of all communication events, by clinical role (NOS = not otherwise specified)

DISCUSSION

Our study involved a relatively small sample of subjects and this must be taken into consideration in any discussion of results. The level of interruption, with about 90% of information transactions involving informal communication rather than interaction with formal information sources, was also highlighted in the original study.[6] Further, since our study was completed a very similar result of 10.3 interruptions per hour has been reported for US emergency departments.[8] Interruptions are an important measure of communication load, as an interruption can disrupt memory and generate errors.[7] The level of multitasking we found is also of concern, as it too may affect memory. The number of items that can be held in memory is very small and several concurrent tasks may overload memory.[9] The combination of multitasking and interruption may be a potent cocktail and a potential source of error.

Our results support those advocating specific communication training in emergency departments, operating rooms, and other high-interaction workplaces.[10] Specific strategies to reduce interruptions have been suggested elsewhere[5,6] and include:

- Education to increase awareness of the costs of interruption;
- Increased use of asynchronous communication tools like email and voicemail;
- Communal communication tools such as message boards, which are well suited to the emergency department setting, as staff are mostly physically collocated.

We found that there were nine times as many informal interactions as there were formal. When considered from an information flow perspective, this is staggering; it suggests that there is a low upper limit on the potential for electronic medical records (EMRs) to improve information processes within healthcare organisations, since the EMR is essentially a formal medium. These findings are consistent with study results from another hospital with EMRs in which 50% of information transactions were still face to face.[11] More positively, it suggests that small improvements in communication may substantially benefit information processes within our organisations, potentially providing greater benefits than EMRs.

Medical staff had fewer information-seeking and -receiving interactions than nursing staff. This may be because they either have a lower information need, or are less likely to seek information than nursing staff. They also seemed to get less information than they asked for. This suggests that medical staff may not be satisfying all the information requests that they receive, nor satisfying all the information requests they themselves make. It fits with the higher communi-

cation load they seem to carry as measured by the multitasking measure. Medical staff may need to have a reduced communication load, or a reduction in peak loading. It is also interesting to find out whether the questions asked by doctors are less easily answered, less well articulated, or perhaps less well delivered.

CONCLUSIONS

The picture of communication within the emergency department suggests that communication processes dominate information exchanges, and that communication may be strained because of the communication loads on individual clinical staff. It suggests that active training to improve team communication, as well as optimisation of communication processes, have the potential to substantially improve clinical work, and may have a positive impact on clinical outcomes.

While it was not the purpose of this study to correlate communication loads with errors or poor outcomes, such studies need to be done. Further research is needed to replicate these findings in other clinical settings, with a view to ensuring that communication processes are considered in any program to reduce error and improve the quality and safety of healthcare delivery.

COMPETING INTERESTS

None declared.

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